

Claims

[c1] An integrated transport system for moving an object in an aircraft between a main cabin and an overhead cabin, the main cabin and the overhead cabin having a shaft in connection therebetween, comprising:

 a single-unit gantry-lift device including an object carrier for receiving the object, said object carrier having at least one restraint member for securing the object in said object carrier and preventing the object from tipping;

 wherein said single-unit gantry-lift device further includes a lift device for moving said object carrier generally along a longitudinal axis of the shaft and a gantry device for moving said object carrier generally along at least one of a first axis of said overhead cabin and a second axis disposed generally perpendicular to said first axis.

[c2] The integrated transport system recited in claim 1 wherein said main cabin is a main deck galley, said overhead cabin being an overhead galley.

[c3] The integrated transport system recited in claim 1 wherein said at least one restraint member is a selected

from the group consisting of at least one belt member, at least one plate member, at least one netting member, and at least one rope member.

- [c4] The integrated transport system recited in claim 1 wherein said lift device includes at least one of a pulley mechanism, a screw mechanism, and a belt mechanism for moving said object carrier along said longitudinal axis of said shaft.
- [c5] The integrated transport system recited in claim 1 wherein at least one of said lift device and said gantry device is a manually operated mechanism.
- [c6] The integrated transport system recited in claim 1 wherein the object is at least one of a galley meal cart and a galley refreshment cart.
- [c7] An integrated transport system for moving an object in an aircraft between a main cabin and an overhead cabin, the main cabin and the overhead cabin having a shaft in connection therebetween, comprising:
 - a single-unit gantry-lift device including an object carrier for receiving the object, said object carrier having at least one restraint member for securing the object in said object carrier and preventing the object from tipping;

wherein said single-unit gantry-lift device further includes a lift device for moving said object carrier generally along a longitudinal axis of the shaft and a gantry device for moving said lift device and said object carrier generally along at least one of a first axis of said overhead cabin and a second axis disposed generally perpendicular to said first axis;

wherein said gantry device includes a pair of rails coupled to said overhead cabin of said airframe, said pair of rails for suspending said object carrier therefrom and preventing said object carrier from tipping, said pair of rails further utilized for moving said object carrier generally along said first axis of said overhead cabin.

- [c8] The integrated transport system recited in claim 7 wherein said main cabin is a main deck galley, said overhead cabin being an overhead galley.
- [c9] The integrated transport system recited in claim 7 wherein said at least one restraint member is a selected from the group consisting of at least one belt member, at least one plate member, at least one netting member, and at least one rope member.
- [c10] The integrated transport system recited in claim 7 wherein said lift device includes at least one of a pulley mechanism, a screw mechanism, and a belt mechanism

for moving said object along said longitudinal axis of said shaft.

- [c11] The integrated transport system recited in claim 7 wherein said pair of rails and said lift device have at least one of a rolling member and a sliding member coupled therebetween for moving said object carrier generally along said first axis of said overhead cabin.
- [c12] The integrated transport system recited in claim 7 wherein at least one of said lift device and said gantry device is a manually operated mechanism.
- [c13] The integrated transport system recited in claim 7 wherein the object is at least one of a galley meal cart and a galley refreshment cart.
- [c14] An aircraft comprising:
 - an airframe;
 - a main cabin defined by said airframe;
 - an overhead cabin defined by said airframe and disposed above said main cabin, said overhead cabin for storing at least one object therein, said overhead cabin having a first axis and a second axis disposed substantially perpendicular to said first axis;
 - a shaft defined by said airframe and extending between said main cabin and said overhead cabin, said shaft hav-

ing a longitudinal axis; and
an integrated transport system for moving an object be-
tween said main cabin and said overhead cabin, said in-
tegrated transport system including a single-unit
gantry-lift device comprised of a lift device for moving
said object through said shaft generally along said longi-
tudinal axis and a gantry device for moving said object
generally along at least one of said first axis and said
second axis of said overhead cabin;
wherein said single-unit gantry-lift device further in-
cludes an object carrier for receiving said object, said
object carrier having at least one restraint member for
securing said object in said object carrier.

- [c15] The aircraft recited in claim 14 wherein said main cabin is a main deck galley, said overhead cabin being an overhead galley.
- [c16] The aircraft recited in claim 14 wherein said at least one restraint member is a selected from the group consisting of at least one belt member, at least one plate member, at least one netting member, and at least one rope member.
- [c17] The aircraft recited in claim 14 wherein said lift device includes at least one of a pulley mechanism, a screw mechanism, and a belt mechanism for moving said ob-

ject along said longitudinal axis of said shaft.

[c18] An aircraft comprising:

- an airframe;
- a main cabin defined by said airframe;
- an overhead cabin defined by said airframe and disposed above said main cabin, said overhead cabin for storing at least one object therein, said overhead cabin having a first axis and a second axis disposed substantially perpendicular to said first axis;
- a shaft defined by said airframe and extending between said main cabin and said overhead cabin, said shaft having a longitudinal axis; and
- an integrated transport system for moving an object between said main cabin and said overhead cabin, said integrated transport system including a single-unit gantry-lift device comprised of a lift device for moving an object through said shaft generally along said longitudinal axis and a gantry device for moving said object generally along at least one of said first axis and said second axis of said overhead cabin;
- wherein said single-unit gantry-lift device further includes an object carrier for receiving said object, said object carrier having at least one restraint member for securing said object in said object carrier;
- wherein said gantry device includes a pair of rails cou-

pled to said said airframe in said overhead cabin, said pair of rails for suspending said object carrier therefrom and preventing said object carrier from tipping, said pair of rails further utilized for moving said object carrier generally along said first axis of said overhead cabin.

- [c19] The aircraft recited in claim 18 wherein said main cabin is a main deck galley, said overhead cabin being an overhead galley.
- [c20] The aircraft recited in claim 18 wherein said at least one restraint member is a selected from the group consisting of at least one belt member, at least one plate member, at least one netting member, and at least one rope member.
- [c21] The aircraft recited in claim 18 wherein said lift device includes at least one of a pulley mechanism, a screw mechanism, and a belt mechanism for moving said object along said longitudinal axis of said shaft.
- [c22] The aircraft recited in claim 18 wherein said pair of rails has at least one of a rolling member and a sliding member coupled thereto which extends from said lift device for moving said object carrier generally along said first axis of said overhead cabin.
- [c23] An aircraft comprising:

an airframe including a bi-level galley module with a main-deck sub-module and an overhead sub-module disposed above said main-deck sub-module, said overhead sub-module for storing at least one object therein and having a first axis and a second axis disposed generally perpendicular to said first axis;

a shaft defined by said bi-level galley module and extending between said main-deck sub-module and said overhead sub-module, said shaft having a longitudinal axis;

an integrated transport system for moving an object through said shaft and between said main-deck sub-module and said overhead sub-module, said integrated transport system including a single-unit gantry-lift device comprised of a lift device for moving said object along said longitudinal axis and a gantry device for moving said object along at least one of said first axis and said second axis;

a ladder extending between said main-deck sub-module and said overhead sub-module for allowing ingress and egress to said overhead sub-module;

a walkway extending generally along said first axis of said overhead sub-module; and

at least one storage area disposed adjacent to said walkway and offset therefrom in a direction generally along said second axis of said overhead sub-module, said at

least one storage area also being located above said walkway.

wherein said single-unit gantry-lift device further includes an object carrier for receiving said object, said object carrier having at least one restraint member for securing said object in said object carrier; wherein said gantry device includes a pair of rails coupled to said overhead sub-module, said pair of rails for suspending said object carrier therefrom and preventing said object carrier from tipping, said pair of rails further utilized for moving said object carrier generally along said first axis of said overhead sub-module.

- [c24] The aircraft recited in claim 23 wherein said at least one restraint member is a selected from the group consisting of at least one belt member, at least one plate member, at least one netting member, and at least one rope member.
- [c25] The aircraft recited in claim 23 wherein said lift device includes at least one of a pulley mechanism, a screw mechanism, and a belt mechanism for moving said object along said longitudinal axis of said shaft.
- [c26] The aircraft recited in claim 23 wherein said pair of rails has at least one of a rolling member and a sliding member coupled thereto which extends from said lift device

for moving said object carrier generally along said first axis of said overhead galley.

[c27] A method for operating an integrated transport system for an aircraft with a main cabin, an overhead cabin disposed above the main cabin, and a shaft in connection between the main cabin and the overhead cabin, comprising:

securing an object to an object carrier of the integrated transport system;

actuating a lift device of a single-unit gantry-lift device for moving said object generally along a longitudinal axis of the shaft;

actuating a gantry device of said single-unit gantry-lift device for moving said object generally along at least one of a first axis of the overhead cabin; and

moving said object generally along a second axis disposed substantially perpendicular to said first axis;

wherein moving said object generally along said second axis comprises moving said object between said object carrier and a storage area in said overhead cabin.

[c28] The method in claim 27 wherein securing said object to said object carrier comprises:

coupling said object to said object carrier via at least one restraint member selected from the group consisting of at least one belt member, at least one plate member, at

least one netting member, and at least one rope member.

- [c29] The method in claim 27 wherein actuating said lift device comprises at least one of:
manually operating at least one of a pulley mechanism, a screw mechanism, and a belt mechanism for moving said object along said longitudinal axis of said shaft; and
actuating a motor for moving said object along said longitudinal axis of said shaft.
- [c30] The method in claim 27 wherein actuating a gantry device comprises at least one of:
manually operating at least one of a rolling member and a sliding member for moving said object along said first axis of said overhead cabin; and
actuating a motor for moving said object along said first axis of said overhead cabin.
- [c31] The method in claim 27 further comprising:
entering the overhead cabin via at least one of a ladder and a staircase extending between the main cabin and the overhead cabin.